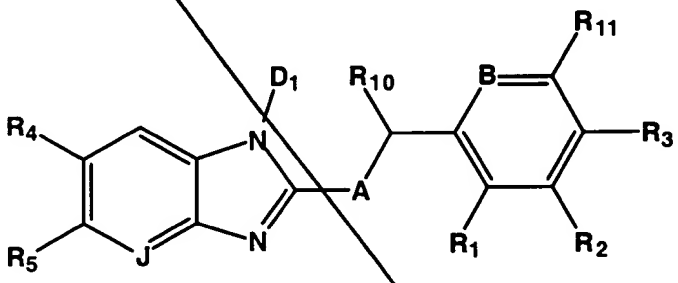
CLAIMS

What is claimed is:

1. A proton pump inhibitor compound comprising at least one NO group, at least one NO_2 group, or at least one NO and NO_2 group, or a pharmaceutically acceptable salt thereof.

2. The proton pump inhibitor compound of claim 1, wherein the compound comprising at least one NO group, at least one NO_2 group, or at least one NO and NO_2 group is a compound of formula (I), formula (II), formula (III), formula (IV), formula (V), formula (VI) or formula (VII), or a pharmaceutically acceptable salt thereof:

wherein the compound of formula (I) is:



(I)

wherein

A is S, S(O), or $S(O)_2$;

B is $-CNR_7R_7'$ or nitrogen;

J is CH or nitrogen;

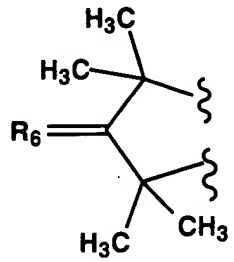
R_1 is a hydrogen, an alkoxy group, a lower alkyl group, or an alkylthio group;

R_2 is a hydrogen, an alkoxy group, a lower alkyl group, an alkylthio group, a haloalkoxy group, an alkoxyalkyl group, $-NR_7R_7'$, $-OD_1$, or $-SD_1$; or R_2 and R_1 taken together with the carbon chain to which they are attached form a cycloalkyl ring or a heterocyclic ring; or R_2 and R_3 taken together with the carbon chain to which they are attached form a cycloalkyl ring or a heterocyclic ring;

R_3 and R_{11} are each independently a hydrogen, an alkoxy group, a lower alkyl group, or an alkylthio group; or R_3 and R_{11} taken together with the carbon chain to

which they are attached form a cycloalkyl ring or a heterocyclic ring;

R_4 and R_5 are each independently a hydrogen, an alkyl group, a halo group, an alkoxy group, a haloalkyl group, a haloalkoxy group, a cyano group, an aryl group, a heterocyclic ring, $-NR_7R_7'$, $-OD_1$, or $-CO_2R_{12}$; or R_4 and R_5 taken together are:



wherein

R_6 is oxygen or $N=O-R_7$;

R_7 and R_7' are each independently hydrogen, a lower alkyl group or D; or R_7 and R_7' taken together with the nitrogen to which they are attached form a heterocyclic ring;

R_{10} is a hydrogen; or R_{10} and R_1 taken together with the carbon chain to which they are attached form a cycloalkyl ring;

R_{12} is a lower alkyl group or D;

D_1 is a hydrogen or D;

D is Q or K;

Q is -NO or $-NO_2$;

K is $-W_a-E_b-(C(R_e)(R_f))_p-E_c-(C(R_e)(R_f))_x-W_d-(C(R_e)(R_f))_y-W_i-E_j-W_g-(C(R_e)(R_f))_z-T-Q$;

a, b, c, d, g, i and j are each independently an integer from 0 to 3;

p, x, y and z are each independently an integer from 0 to 10;

W at each occurrence is independently -C(O)-, -C(S)-, -T-, $-(C(R_e)(R_f))_h-$, an alkyl group, an aryl group, a heterocyclic ring, an arylheterocyclic ring, or $-(CH_2CH_2O)_q-$;

E at each occurrence is independently -T-, an alkyl group, an aryl group, $-(C(R_e)(R_f))_h-$, a heterocyclic ring, an arylheterocyclic ring, or $-(CH_2CH_2O)_q-$;

h is an integer form 1 to 10;

q is an integer from 1 to 5;

R_e and R_f are each independently a hydrogen, an alkyl, a cycloalkoxy, a

halogen, a hydroxy, an hydroxyalkyl, an alkoxyalkyl, an arylheterocyclic ring, an alkylaryl, a cycloalkylalkyl, a heterocyclicalkyl, an alkoxy, a haloalkoxy, an amino, an alkylamino, a dialkylamino, an arylamino, a diarylamino, an alkylarylamino, an alkoxyhaloalkyl, a haloalkoxy, a sulfonic acid, a sulfonic ester, an alkylsulfonic acid, an arylsulfonic acid, an arylalkoxy, an alkylthio, an arylthio, a cycloalkylthio, a cycloalkenyl, a cyano, an aminoalkyl, an aminoaryl, an aryl, an arylalkyl, an alkylaryl, a carboxamido, a alkylcarboxamido, an arylcarboxamido, an amidyl, a carboxyl, a carbamoyl, an alkylcarboxylic acid, an arylcarboxylic acid, an alkylcarbonyl, an arylcarbonyl, an ester, a carboxylic ester, an alkylcarboxylic ester, an arylcarboxylic ester, a haloalkoxy, a sulfonamido, an alkylsulfonamido, an arylsulfonamido, a sulfonic ester, a urea, a phosphoryl, a nitro, -T-Q , or $(C(R_e)(R_f))_k$-T-Q, or R_e and R_f taken together with the carbons to which they are attached form a carbonyl, a methanthial, a heterocyclic ring, a cycloalkyl group or a bridged cycloalkyl group;

k is an integer from 1 to 3;

T at each occurrence is independently a covalent bond, a carbonyl, an oxygen, $-S(O)_o-$ or $-N(R_a)R_i-$;

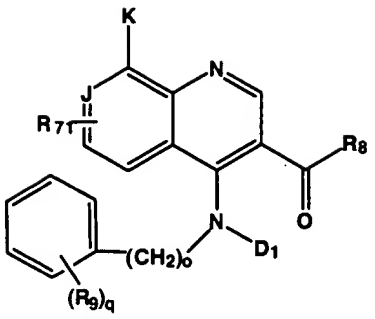
o is an integer from 0 to 2;

R_a is a lone pair of electrons, a hydrogen or an alkyl group;

R_i is a hydrogen, an alkyl, an aryl, an alkylcarboxylic acid, an arylcarboxylic acid, an alkylcarboxylic ester, an arylcarboxylic ester, an alkylcarboxamido, an arylcarboxamido, an alkylaryl, an alkylsulfinyl, an alkylsulfonyl, an arylsulfinyl, an arylsulfonyl, a sulfonamido, a carboxamido, a carboxylic ester, an amino alkyl, an amino aryl, $-CH_2-C(T-Q)(R_e)(R_f)$, or $-(N_2O_2-)^-\bullet M^+$, wherein M^+ is an organic or inorganic cation; with the proviso that when R_i is $-CH_2-C(T-Q)(R_e)(R_f)$ or $-(N_2O_2)^-\bullet M^+$, or R_e or R_f are T-Q or $(C(R_e)(R_f))_k$-T-Q, then the "-T- Q" subgroup can be a hydrogen, an alkyl, an alkoxy, an alkoxyalkyl, an aminoalkyl, a hydroxy, a heterocyclic ring or an aryl group; and

with the proviso that the compound of formula (I) must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

wherein the compound of formula (II) is:



II

wherein

R_8 is a lower alkyl group, an alkoxyalkyl group, an alkylaryl group, a cycloalkyl group, a cycloalkylalkyl group, an aryl group, an alkylaryl group, or K;

R_9 at each occurrence is independently a hydrogen, a lower alkyl group, an akylthio group, a halogen, a cyano group an alkanoyl group, a haloalkyl group, a carbamoyl group, $-NR_7D_1$, $-OD_1$, or $-CO_2R_{12}$;

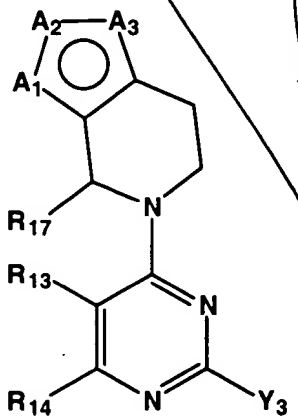
R_{71} is a hydrogen, a lower alkyl group, an alkoxy group, or $-OD_1$;

J, K, D_1, R_7, R_{12}, q and o are as defined herein; and

with the proviso that the compound of formula (II) must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

wherein the compound of formula (III) is:

wherein

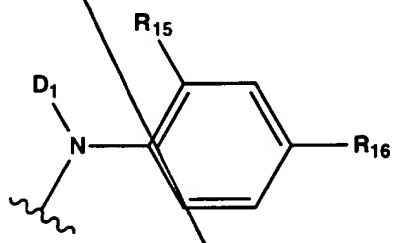


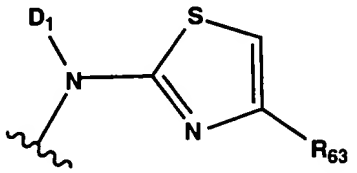
III

R_{13} and R_{14} are each independently a hydrogen a lower alkyl group, an alkoxyalkyl, or a lower alkyl-OD_1; or R_{13} and R_{14} taken together along with the carbons to which they are attached form a cycloalkyl group or an aryl group;

R_{17} is a hydrogen or a lower alkyl group;

Y_3 is:

(a) 

or (b) 

wherein

R_{15} is a hydrogen or a lower alkyl group;

R_{16} is a hydrogen, a halogen, or a lower alkyl group;

R_{63} is a lower alkyl group or a phenyl group;

A_1, A_2 and A_3 comprise the other subunits of a 5- or 6-membered monocyclic aromatic ring and A_1, A_2 and A_3 are each independently:

(i) CR_o, wherein R_o at each occurrence is hydrogen or $-OD_1$;

(ii) N-R_p, wherein R_p at each occurrence is independently a covalent bond to an adjacent ring atom in order to render the ring aromatic, a hydrogen, or K;

(iii) a sulfur atom;

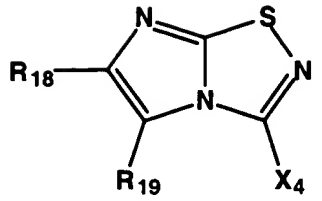
(iv) an oxygen atom; or

(v) B_a= B_b, wherein B_a and B_b are each independently a nitrogen atom or CR_o; wherein R_o at each occurrence is hydrogen or $-OD_1$;

D_1 and K are as defined herein; and

with the proviso that the compound of formula (III) must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

wherein the compound of formula (IV) is:



IV

wherein

R_{18} and R_{19} at each occurrence are each independently a hydrogen, a lower alkyl group, a halogen, a nitro group, an alkoxy group, $-OD_1$, $-NR_{20}R_{21}$, $-O(O)CR_{20}$, $-O(O)COR_{20}$, $-O(O)CNR_{20}R_{21}$, $-N(R_{20})C(O)R_{21}$, $-N(R_{20})C(O)NR_{20}R_{21}$, or $-N(R_{20})C(O)OR_{21}$; or R_{18} and R_{19} when taken together along with the carbons to which they are attached form a heterocyclic ring or a phenyl ring optionally substituted with up to four substituents selected from a hydrogen, a lower alkyl group, a halogen, a nitro group, an alkoxy group, $-OD_1$, $-NR_{20}R_{21}$, $-O(O)CR_{20}$, $-O(O)COR_{20}$, $-O(O)CNR_{20}R_{21}$, $-N(R_{20})C(O)R_{21}$, $-N(R_{20})C(O)NR_{20}R_{21}$, or $-N(R_{20})C(O)OR_{21}$;

R_{20} and R_{21} at each occurrence are each independently a hydrogen, a lower alkyl group, an aryl group, a lower alkylaryl group, or K;

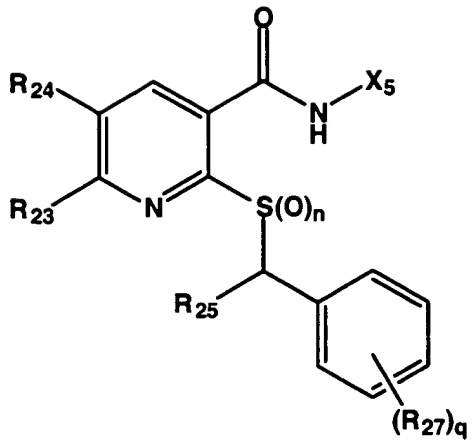
X_4 is $-C(=R_6)R_{22}$, a heterocyclic ring, $-NR_{20}R_{21}$, a halogen, an alkoxy group, an arylalkoxy group, a cycloalkoxy group, a heterocyclicalkoxy group, an alkylsulfonyl group, an alkylsulfinyl group, an arylsulfonyl group, an arylsulfinyl group an arylalkylsulfonyl group, an arylalkylsulfinyl group, a heterocyclicsulfonyl group, or a heterocyclicsulfinyl group;

R_{22} is a hydrogen, an alkyl group, an alkoxy group, an aryl group, an alkylaryl group, a heterocyclic ring, an -O-heterocyclic ring, or an alkylheterocyclic ring;

D_1, R_6, and K are defined as herein; and

with the proviso that the compound of formula (IV must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

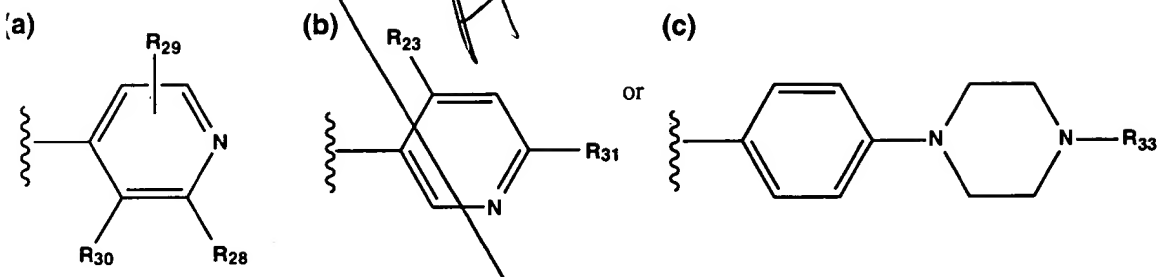
wherein the compound of formula (V) is:



(V)

wherein

X_5 is:



R_{23} is a hydrogen, a dialkylamino group, -NR_7R_7', or a heterocyclic ring;

R_{24} is a hydrogen or halogen;

R_{25} is a hydrogen, -OD_1, or lower alkyl-OD_1;

R_{27} at each occurrence is independently a hydrogen or an alkoxy group;

R_{28}, R_{29}, and R_{30} are each independently a hydrogen, a lower alkyl group, a dialkylamino group, a heterocyclic ring, or a lower alkyl-OD_1;

R_{31} is a hydrogen, a dialkylamino group, or an alkoxy group;

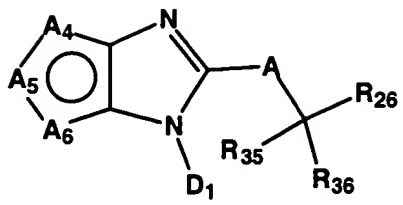
R_{33} is a hydrogen or a lower alkyl group;

n is an integer from 0 to 1;

R_7, R_7', D_1 and q are as defined herein; and

with the proviso that the compound of formula (V) must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

wherein the compound of formula (VI) is:



VI

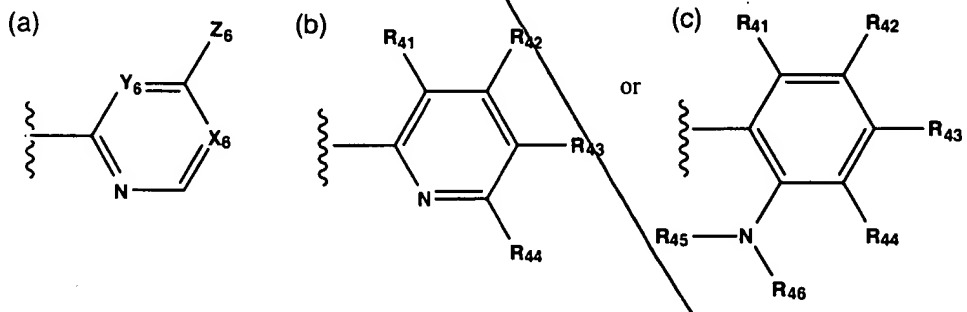
wherein

A_4, A_5, and A_6 are each independently a sulfur or CR_{34} with the proviso that one of A_4, A_5, or A_6 is a sulfur and the other two are CR_{34};

R_{34} at each occurrence is independently a hydrogen, a halogen, a cyano, a nitro, a trifluoromethyl, a lower alkyl group, a heterocyclic ring, a lower alkyl-OD_1, an alkoxy, a haloalkoxy, an alkylthio, an alkylsulfinyl, an alkylsulfonyl, an alkylcarbonyl, an alkoxycarbonyl, a carbamoyl, a N-alkylcarbamoyl, a N,N-di-alkylcarbamoyl, an ester, a cycloalkyl, an aryl, an alkylaryl, an aryloxy, an arylalkoxyoxy, an arylamino, a alkylarylamino, an arylthio, an arylsulfonyl, an arylsulfinyl, or a sulfonamido;

R_{35} and R_{36} are each independently a hydrogen or a lower alkyl group; or R_{35} and R_{41} taken together with the carbon chain to which they are attached form a cycloalkyl ring;

R_{26} is:



wherein

X_6 is nitrogen, and Y_6 is CR_{37}; or X_6 is CR_{37}, and Y_6 is nitrogen;

R_{37} is a hydrogen, a halogen, a lower alkyl group, a trifluoromethyl, an alkoxy

group, a haloalkoxy group, an aryl group, an arylalkoxy group, a heterocyclic ring, or an aryloxy;

Z_6 is $-NR_{38}R_{39}$, SR_{40}, or an arylalkoxy group;

R_{38} and R_{39} are each independently a hydrogen, a lower alkyl group, an aryl group, an alkylaryl group, or a cycloalkyl group; or R_{38} and R_{39} taken together with the nitrogen to which they are attached form a heterocyclic ring;

R_{40} is a hydrogen, a halogen, a lower alkyl group, an alkylaryl group, an alkenyl group, or a haloalkyl group;

R_{41}, R_{42}, R_{43}, and R_{44} are each independently a hydrogen, a halogen, a lower alkyl group, an alkoxy group, a haloalkoxy group, an alkoxyaryl group, an alkylthio group, an alkysulfinyl group, an alkylsulfonyl group, a cyano group, -Y-OD_1, -Y-SD_1, -Y-$NR_{20}R_{21}$, -Y-$O(O)CR_{20}$, -Y-$O(O)CNR_{20}R_{21}$, -Y-$N(R_{20})C(O)R_{21}$, or -Y-$N(R_{20})S(O)_2R_{21}$;

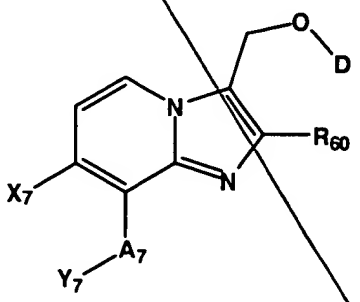
Y is $-(CH_2)_a-$ or a phenyl group;

R_{45} and R_{46} are each independently a hydrogen, a lower alkyl group, a cycloalkyl group, an alkenyl group, or an alkynyl group;

D_1, R_{20}, R_{21}, and a are as defined herein; and

with the proviso that the compound of formula (VI) must contain at least one nitrite, nitrate, thionitrite or thionitrate group;

wherein the compound of formula (VII) is:



VII

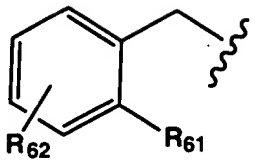
wherein

R_{60} is a lower alkyl group, an aryl group, a haloalkyl group, a lower alkyl-OD_1, or heterocyclic ring;

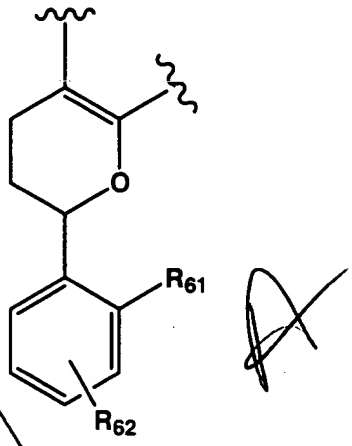
A_7 is oxygen or $-ND_1$;

X_7 is a hydrogen or a halogen;

Y_7 is:



or X_7, A_7, and Y_7 taken together along with the carbons to which they are attached is:



wherein

R_{61} is a hydrogen, a halogen, a lower alkyl group, -OD_1, or –NHC(O)O-lower alkyl;

R_{62} is a hydrogen, a halogen, or a lower alkyl group; and

D_1 is as defined herein.

3. The compound of claim 2, wherein the compound is a benzimidazole, a quinoline, a pyrimidine, a thiadiazole, a sulfinylnicotinamide, a thienoimidazole, or a imidazopyridine.

4. The compound of claim 3, wherein the benzimidazole is omeprazole, lansoprazole, pantoprazole, rabeprazole, leminoprazole, timoprazole, tenatoprazole, disulprazole, esomeprazole, 2-(2-benzimidazolyl)-pyridine, a tricyclic imidazole, a thienopydidine benzimidazole, a fluoroalkoxy substituted benzimidazole, a dialkoxy benzimidazole, a N-substituted 2-

(pyridylalkenesulfinyl) benzimidazole, a cycloheptenepyridine, a 5-pyrrolyl-2-pyridylmethylsulfinyl benzimidazole, a alkylsulfinyl benzimidazole, a fluoro-pyridylmethylsulfinyl benzimidazole, an imidazo[4,5-b]pydridine, RO 18-5362 or IY 81149; wherein the quinoline is a 4-amino-3-carbonyl quinoline, a 4-amino-3-acylnaphthyride, a 4-aminoquinoline, a 4-amino-3-acylquinoline or a 3-butyryl-4-(2-methylphenylamino)-8-(2-hydroxyethoxy)quinoline; wherein the pyrimidine is a quinazoline, a tetrahydroisoquinolin-2-yl pyrimidine or YH 1885; wherein the thiadiazole is 3-substituted 1,2,4-thiadiazolo[4,5-a] benzimidazole or a 3-substituted imidazo[1,2-d]-thiadiazole; wherein the sulfinylnicotinamide is a 2-sulfinylnicotinamide; wherein the thienoimidazole is a pyridylsulfinylbenz imidazole, a pyridylsulfinyl thieno imidazole, a theinoimidazole-toluidine, a 4,5-dihydrooxazole, a thienoimidazole-toluidine or Hoe-731; wherein the imidazopyridine is a imidazo[1,2-a]pyridine, a pyrrolo[2,3-b]pyridine or a pharmaceutically acceptable salt thereof.

5. A composition comprising the compound of claim 2 and a pharmaceutically acceptable carrier.

6. The composition of claim 5, further comprising at least one of a nonsteroidal antiinflammatory drug, a selective COX-2 inhibitor, an antacid, a bismuth-containing reagent, and an acid-degradable antibacterial compound.

7. A method for treating or preventing a gastrointestinal disorder, facilitating ulcer healing, or decreasing the recurrence of an ulcer in a patient in need thereof comprising administering to the patient a therapeutically effective amount of the composition of claim 5.

8. The method of claim 7, further comprising administering to the patient a therapeutically effective amount of an antacid.

9. The method of claim 7, wherein the gastrointestinal disorder is an inflammatory bowel disease, Crohn's disease, irritable bowel syndrome, ulcerative colitis, a peptic ulcer, a stress ulcers, a bleeding peptic ulcer, a duodenal ulcer, infectious enteritis, colitis, diverticulitis, gastric hyperacidity, dyspepsia, gastroparesis, Zollinger-Ellison syndrome, gastroesophageal reflux disease, *Helicobacter Pylori* associated disease, short-bowel syndrome, or a hypersecretory state associated with systemic mastocytosis or basophilic leukemia and

hyperhistaminemia.

10. A method for improving the gastroprotective properties, the anti-*Helicobacter pylori* properties, or the antacid properties of a proton pump inhibitor comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 5.

11. The method of claim 10, further comprising administering to the patient a therapeutically effective amount of a bismuth-containing reagent.

12. A method for decreasing or reversing gastrointestinal toxicity or facilitating ulcer healing resulting from administration of a nonsteroidal antiinflammatory drug and/or a selective COX-2 inhibitor to a patient comprising administering to a patient in need thereof a therapeutically effective amount of at least one composition of claim 5, and, optionally, at least one nonsteroidal antiinflammatory drug and/or selective COX-2 inhibitor.

13. A method for treating *Helicobacter pylori* comprising administering to a patient in need thereof a therapeutically effective amount of at least one acid degradable antibacterial compound and at least one composition of claim 5.

14. A method for treating a viral infection comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 5.

15. The method of claim 14, wherein the viral infection is orthomyxoviridae, paramyxoviridae, picornaviridae, rhabdoviridae, coronavaridae, togaviridae, bunyaviridae, arenaviridae, reteroviridae, adenoviridae, proxviridae, papovaviridae, herpetoviridae, herpesviridae, herpes simplex viruses, cytomegalovirus, herpes varicella-zoster, Epstein-Barr, HHV6, HHV7, pseudorabies or rhinotracheitis.

16. A composition comprising at least one compound of claim 2 or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

17. The composition of claim 16 further comprising a pharmaceutically acceptable carrier.

18. The composition of claim 16, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor or is a substrate for nitric oxide synthase is an S-nitrosothiol.

19. The composition of claim 18, wherein the S-nitrosothiol is S-nitroso-N-acetylcysteine, S-nitroso-captopril, S-nitroso-N-acetylpenicillamine, S-nitroso-homocysteine, S-nitroso-cysteine or S-nitroso-glutathione.

20. The composition of claim 16, wherein the S-nitrosothiol is:

(i) $HS(C(R_e)(R_f))_mSNO$;

(ii) $ONS(C(R_e)(R_f))_mR_e$; and

(iii) $H_2N\text{-}CH(CO_2H)\text{-}(CH_2)_m\text{-}C(O)NH\text{-}CH(CH_2SNO)\text{-}C(O)NH\text{-}CH_2\text{-}CO_2H$;

wherein m is an integer from 2 to 20; R_e and R_f are each independently a hydrogen, an alkyl, a cycloalkoxy, a halogen, a hydroxy, an hydroxyalkyl, an alkoxyalkyl, an arylheterocyclic ring, an alkylaryl, a cycloalkylalkyl, a heterocyclicalkyl, an alkoxy, a haloalkoxy, an amino, an alkylamino, a dialkylamino, an arylamino, a diarylamino, an alkylarylamino, an alkoxyhaloalkyl, a haloalkoxy, a sulfonic acid, a sulfonic ester, an alkylsulfonic acid, an arylsulfonic acid, an arylalkoxy, an alkylthio, an arylthio, a cycloalkylthio, a cycloalkenyl, a cyano, an aminoalkyl, an aminoaryl, an aryl, an arylalkyl, an alkylaryl, a carboxamido, a alkylcarboxamido, an arylcarboxamido, an amidyl, a carboxyl, a carbamoyl, an alkylcarboxylic acid, an arylcarboxylic acid, an alkylcarbonyl, an arylcarbonyl, an ester, a carboxylic ester, an alkylcarboxylic ester, an arylcarboxylic ester, a haloalkoxy, a sulfonamido, an alkylsulfonamido, an arylsulfonamido, a sulfonic ester, a urea, a phosphoryl, a nitro, -T-Q , or $(C(R_e)(R_f))_k$-T-Q, or R_e and R_f taken together with the carbons to which they are attached form a carbonyl, a methanthial, a heterocyclic ring, a cycloalkyl group or a bridged cycloalkyl group; Q is -NO or $-NO_2$; and T is independently a covalent bond, a carbonyl, an oxygen, $-S(O)_o$- or $-N(R_a)R_i$-, wherein o is an integer from 0 to 2, R_a is a lone pair of electrons, a hydrogen or an alkyl group; R_i is a hydrogen, an alkyl, an aryl, an alkylcarboxylic acid, an aryl carboxylic acid, an alkylcarboxylic ester, an arylcarboxylic ester, an alkylcarboxamido, an arylcarboxamido, an alkylaryl, an alkylsulfinyl, an alkylsulfonyl, an arylsulfinyl, an arylsulfonyl, a sulfonamido, a carboxamido, a carboxylic ester, an amino alkyl, an amino aryl, $-CH_2\text{-}C(T\text{-}Q)(R_e)(R_f)$, or $-(N_2O_2\text{-})^-\bullet M^+$,

wherein M^+ is an organic or inorganic cation; with the proviso that when R_i is $-CH_2-C(T-Q)(R_e)(R_f)$ or $-(N_2O_2-)\bullet M^+$; then "-T-Q" can be a hydrogen, an alkyl group, an alkoxyalkyl group, an aminoalkyl group, a hydroxy group or an aryl group.

21. The composition of claim 16, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase, is L-arginine, L-homoarginine, N-hydroxy-L-arginine, nitrosated L-arginine, nitrosylated L-arginine, nitrosated N-hydroxy-L-arginine, nitrosylated N-hydroxy-L-arginine, citrulline, ornithine, glutamine, lysine, polypeptides comprising at least one of these amino acids or inhibitors of the enzyme arginase.

22. The composition of claim 16, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase is:

(i) a compound that comprises at least one ON-O-, ON-N- or ON-C- group;

(ii) a compound that comprises at least one O_2N-O-, O_2N-N-, O_2N-S- or -O_2N-C- group;

(iii) a N-oxo-N-nitrosoamine having the formula: R^1R^2-N(O-M^+)-NO, wherein R^1 and R^2 are each independently a polypeptide, an amino acid, a sugar, an oligonucleotide, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted hydrocarbon, or a heterocyclic group, and M^+ is an organic or inorganic cation.

23. The composition of claim 22, wherein the compound comprising at least one ON-O-, ON-N- or ON-C- group is an ON-O-polypeptide, an ON-N-polypepetide, an ON-C-polypeptide, an ON-O-amino acid, an ON-N-amino acid, an ON-C-amino acid, an ON-O-sugar, an ON-N-sugar, an ON-C-sugar, an ON-O-oligonucleotide, an ON-N-oligonucleotide, an ON-C-oligonucleotide, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or aromatic ON-O-hydrocarbon, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or aromatic ON-N-hydrocarbon, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or

aromatic ON-C-hydrocarbon, an ON-O-heterocyclic compound, an ON-N-heterocyclic compound or a ON-C-heterocyclic compound.

24. The composition of claim 22, wherein compound comprising at least one O_2N-O-, O_2N-N-, O_2N-S- or O_2N-C- group is an O_2N-O-polypeptide, an O_2N-N-polypeptide, an O_2N-S-polypeptide, an O_2N-C-polypeptide, an O_2N-O-amino acid, O_2N-N-amino acid, O_2N-S-amino acid, an O_2N-C-amino acid, an O_2N-O-sugar, an O_2N-N-sugar, O_2N-S-sugar, an O_2N-C-sugar, an O_2N-O-oligonucleotide, an O_2N-N-oligonucleotide, an O_2N-S-oligonucleotide, an O_2N-C-oligonucleotide, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-O-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-N-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-S-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-C-hydrocarbon, an O_2N-O-heterocyclic compound, an O_2N-N-heterocyclic compound, an O_2N-S-heterocyclic compound or an O_2N-C-heterocyclic compound.

25. The composition of claim 16, further comprising at least one of a nonsteroidal antiinflammatory drug, a selective COX-2 inhibitor, an antacid, a bismuth-containing reagent, and an acid-degradable antibacterial compound.

26. A method for treating or preventing a gastrointestinal disorder, facilitating ulcer healing, or decreasing the recurrence of an ulcer in a patient in need thereof comprising administering to the patient a therapeutically effective amount of the composition of claim 16.

27. The method of claim 26, further comprising administering to the patient a therapeutically effective amount of an antacid.

28. The method of claim 26, wherein the gastrointestinal disorder is an inflammatory bowel disease, Crohn's disease, irritable bowel syndrome, ulcerative colitis, a peptic ulcer, a stress ulcers, a bleeding peptic ulcer, a duodenal ulcer, infectious enteritis, colitis, diverticulitis, gastric hyperacidity, dyspepsia, gastroparesis, Zollinger-Ellison syndrome, gastroesophageal reflux disease, *Helicobacter Pylori* associated disease, short-bowel syndrome, or a hypersecretory state associated with systemic mastocytosis or basophilic leukemia and

hyperhistaminemia.

29. A method for improving the gastroprotective properties, the anti-*Helicobacter pylori* properties, or the antacid properties of a proton pump inhibitor comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 16.

30. The method of claim 29, further comprising administering to the patient a therapeutically effective amount of a bismuth-containing reagent.

31. A method for decreasing or reversing gastrointestinal toxicity or facilitating ulcer healing resulting from administration of a nonsteroidal antiinflammatory drug and/or a selective COX-2 inhibitor to a patient comprising administering to a patient in need thereof a therapeutically effective amount of at least one composition of claim 16, and, optionally, at least one nonsteroidal antiinflammatory drug and/or selective COX-2 inhibitor.

32. A method for treating *Helicobacter pylori* comprising administering to a patient in need thereof a therapeutically effective amount of at least one acid degradable antibacterial compound and at least one composition of claim 16.

33. A method for treating a viral infection comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 16.

34. The method of claim 33, wherein the viral infection is orthomyxoviridae, paramyxoviridae, picornaviridae, rhabdoviridae, coronavaridae, togaviridae, bunyaviridae, arenaviridae, reteroviridae, adenoviridae, proxviridae, papovaviridae, herpetoviridae, herpesviridae, herpes simplex viruses, cytomegalovirus, herpes varicella-zoster, Epstein-Barr, HHV6, HHV7, pseudorabies or rhinotracheitis.

35. A composition comprising at least one proton pump inhibitor compound or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

36. The composition of claim 35, wherein the at least one proton pump inhibitor compound is a benzimidazole, a quinoline, a pyrimidine, a thiadiazole,

a sulfinylnicotinamide, a thienoimidazole, or a imidazopyridine.

37. The compound of claim 36, wherein the benzimidazole is omeprazole, lansoprazole, pantoprazole, rabeprazole, leminoprazole, timoprazole, tenatoprazole, disulprazole, esomeprazole, 2-(2-benzimidazolyl)-pyridine, a tricyclic imidazole, a thienopydidine benzimidazole, a fluoroalkoxy substituted benzimidazole, a dialkoxy benzimidazole, a N-substituted 2-(pyridylalkenesulfinyl) benzimidazole, a cycloheptenepyridine, a 5-pyrrolyl-2-pyridylmethylsulfinyl benzimidazole, a alkylsulfinyl benzimidazole, a fluoro-pyridylmethylsulfinyl benzimidazole, an imidazo[4,5-b]pydridine, RO 18-5362 or IY 81149; wherein the quinoline is a 4-amino-3-carbonyl quinoline, a 4-amino-3-acylnaphthyride, a 4-aminoquinoline, a 4-amino-3-acylquinoline or a 3-butyryl-4-(2-methylphenylamino)-8-(2-hydroxyethoxy)quinoline; wherein the pyrimidine is a quinazoline, a tetrahydroisoquinolin-2-yl pyrimidine or YH 1885; wherein the thiadiazole is 3-substituted 1,2,4-thiadiazolo[4,5-a] benzimidazole or a 3-substituted imidazo[1,2-d]-thiadiazole; wherein the sulfinylnicotinamide is a 2-sulfinylnicotinamide; wherein the thienoimidazole is a pyridylsulfinylbenz imidazole, a pyridylsulfinyl thieno imidazole, a theinoimidazole-toluidine, a 4,5-dihydrooxazole, a thienoimidazole-toluidine or Hoe-731; wherein the imidazopyridine is a imidazo[1,2-a]pyridine, a pyrrolo[2,3-b]pyridine or a pharmaceutically acceptable salt thereof.

38. The composition of claim 37 further comprising a pharmaceutically acceptable carrier.

39. The composition of claim 35, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase is an S-nitrosothiol.

40. The composition of claim 39, wherein the S-nitrosothiol is S-nitroso-N-acetylcysteine, S-nitroso-captopril, S-nitroso-N-acetylpenicillamine, S-nitroso-homocysteine, S-nitroso-cysteine or S-nitroso-glutathione.

41. The composition of claim 39, wherein the S-nitrosothiol is:

(i) $HS(C(R_e)(R_f))_mSNO$;

(ii) $ONS(C(R_e)(R_f))_mR_e$; and

(iii) H_2N-CH(CO_2H)-(CH_2)$_m$-C(O)NH-CH(CH_2SNO)-C(O)NH-CH_2-CO_2H; wherein m is an integer from 2 to 20; R_e and R_f are each independently a hydrogen, an alkyl, a cycloalkoxy, a halogen, a hydroxy, an hydroxyalkyl, an alkoxyalkyl, an arylheterocyclic ring, an alkylaryl, a cycloalkylalkyl, a heterocyclicalkyl, an alkoxy, a haloalkoxy, an amino, an alkylamino, a dialkylamino, an arylamino, a diarylamino, an alkylarylamino, an alkoxyhaloalkyl, a haloalkoxy, a sulfonic acid, a sulfonic ester, an alkylsulfonic acid, an arylsulfonic acid, an arylalkoxy, an alkylthio, an arylthio, a cycloalkylthio, a cycloalkenyl, a cyano, an aminoalkyl, an aminoaryl, an aryl, an arylalkyl, an alkylaryl, a carboxamido, a alkylcarboxamido, an arylcarboxamido, an amidyl, a carboxyl, a carbamoyl, an alkylcarboxylic acid, an arylcarboxylic acid, an alkylcarbonyl, an arylcarbonyl, an ester, a carboxylic ester, an alkylcarboxylic ester, an arylcarboxylic ester, a haloalkoxy, a sulfonamido, an alkylsulfonamido, an arylsulfonamido, a sulfonic ester, a urea, a phosphoryl, a nitro, -T-Q , or ($C(R_e)(R_f)$)$_k$-T-Q, or R_e and R_f taken together with the carbons to which they are attached form a carbonyl, a methanthial, a heterocyclic ring, a cycloalkyl group or a bridged cycloalkyl group; Q is -NO or -NO_2; and T is independently a covalent bond, a carbonyl, an oxygen, -$S(O)_o$- or -$N(R_a)R_i$-, wherein o is an integer from 0 to 2, R_a is a lone pair of electrons, a hydrogen or an alkyl group; R_i is a hydrogen, an alkyl, an aryl, an alkylcarboxylic acid, an aryl carboxylic acid, an alkylcarboxylic ester, an arylcarboxylic ester, an alkylcarboxamido, an arylcarboxamido, an alkylaryl, an alkylsulfinyl, an alkylsulfonyl, an arylsulfinyl, an arylsulfonyl, a sulfonamido, a carboxamido, a carboxylic ester, an amino alkyl, an amino aryl, -CH_2-C(T-Q)(R_e)(R_f), or -(N_2O_2-)$^-$•M^+, wherein M^+ is an organic or inorganic cation; with the proviso that when R_i is -CH_2-C(T-Q)(R_e)(R_f) or -(N_2O_2-)•M^+; then "-T-Q" can be a hydrogen, an alkyl group, an alkoxyalkyl group, an aminoalkyl group, a hydroxy group or an aryl group.

42. The composition of claim 35, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase is L-arginine, L-homoarginine, N-hydroxy-L-arginine, nitrosated L-arginine, nitrosylated L-arginine, nitrosated N-hydroxy-L-arginine, nitrosylated N-hydroxy-L-arginine, citrulline, ornithine, glutamine, lysine, polypeptides

comprising at least one of these amino acids or inhibitors of the enzyme arginase.

43. The composition of claim 35, wherein the compound that donates, transfers, or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase is:

(i) a compound that comprises at least one ON-O-, ON-N- or ON-C- group;

(ii) a compound that comprises at least one O_2N-O-, O_2N-N-, O_2N-S- or -O_2N-C- group;

(iii) a N-oxo-N-nitrosoamine having the formula: R^1R^2-N(O-M^+)-NO, wherein R^1 and R^2 are each independently a polypeptide, an amino acid, a sugar, an oligonucleotide, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted hydrocarbon, or a heterocyclic group, and M^+ is an organic or inorganic cation.

44. The composition of claim 43, wherein the compound comprising at least one ON-O-, ON-N- or ON-C- group is an ON-O-polypeptide, an ON-N-polypepetide, an ON-C-polypeptide, an ON-O-amino acid, an ON-N-amino acid, an ON-C-amino acid, an ON-O-sugar, an ON-N-sugar, an ON-C-sugar, an ON-O-oligonucleotide, an ON-N-oligonucleotide, an ON-C-oligonucleotide, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or aromatic ON-O-hydrocarbon, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or aromatic ON-N-hydrocarbon, a straight or branched, saturated or unsaturated, substituted or unsubstituted, aliphatic or aromatic ON-C-hydrocarbon, an ON-O-heterocyclic compound, an ON-N-heterocyclic compound or a ON-C-heterocyclic compound.

45. The composition of claim 43, wherein compound comprising at least one O_2N-O-, O_2N-N-, O_2N-S- or O_2N-C- group is an O_2N-O-polypeptide, an O_2N-N-polypeptide, an O_2N-S-polypeptide, an O_2N-C-polypeptide, an O_2N-O-amino acid, O_2N-N-amino acid, O_2N-S-amino acid, an O_2N-C-amino acid, an O_2N-O-sugar, an O_2N-N-sugar, O_2N-S-sugar, an O_2N-C-sugar, an O_2N-O-oligonucleotide, an O_2N-N-oligonucleotide, an O_2N-S-oligonucleotide, an O_2N-C-oligonucleotide, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or

unsubstituted O_2N-O-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-N-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-S-hydrocarbon, a straight or branched, saturated or unsaturated, aliphatic or aromatic, substituted or unsubstituted O_2N-C-hydrocarbon, an O_2N-O-heterocyclic compound, an O_2N-N-heterocyclic compound, an O_2N-S-heterocyclic compound or an O_2N-C-heterocyclic compound.

46. The composition of claim 35, further comprising at least one of a nonsteroidal antiinflammatory drug, a selective COX-2 inhibitor, an antacid, a bismuth-containing reagent and an acid-degradable antibacterial compound.

47. A method for treating or preventing a gastrointestinal disorder, facilitating ulcer healing, or decreasing the recurrence of an ulcer in a patient in need thereof comprising administering to the patient a therapeutically effective amount of the composition of claim 35.

48. The method of claim 47, further comprising administering to the patient a therapeutically effective amount of an antacid.

49. The method of claim 47, wherein the gastrointestinal disorder is an inflammatory bowel disease, Crohn's disease, irritable bowel syndrome, ulcerative colitis, a peptic ulcer, a stress ulcers, a bleeding peptic ulcer, a duodenal ulcer, infectious enteritis, colitis, diverticulitis, gastric hyperacidity, dyspepsia, gastroparesis, Zollinger-Ellison syndrome, gastroesophageal reflux disease, *Helicobacter Pylori* associated disease, short-bowel syndrome, or a hypersecretory state associated with systemic mastocytosis or basophilic leukemia and hyperhistaminemia.

50. A method for improving the gastroprotective properties, the anti-*Helicobacter pylori* properties, or the antacid properties of a proton pump inhibitor comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 35.

51. The method of claim 50, further comprising administering to the patient a therapeutically effective amount of a bismuth-containing reagent.

52. A method for decreasing or reversing gastrointestinal toxicity or facilitating ulcer healing resulting from administration of a nonsteroidal

antiinflammatory drug and/or a selective COX-2 inhibitor to a patient comprising administering to a patient in need thereof a therapeutically effective amount of at least one composition of claim 35, and, optionally, at least one nonsteroidal antiinflammatory drug and/or selective COX-2 inhibitor.

53. A method for treating *Helicobacter pylori* comprising administering to a patient in need thereof a therapeutically effective amount of at least one acid degradable antibacterial compound and at least one composition of claim 35.

54. A method for treating a viral infection comprising administering to a patient in need thereof a therapeutically effective amount of the composition of claim 35.

55. The method of claim 54, wherein the viral infection is orthomyxoviridae, paramyxoviridae, picornaviridae, rhabdoviridae, coronavaridae, togaviridae, bunyaviridae, arenaviridae, reteroviridae, adenoviridae, proxviridae, papovaviridae, herpetoviridae, herpesviridae, herpes simplex viruses, cytomegalovirus, herpes varicella-zoster, Epstein-Barr, HHV6, HHV7, pseudorabies or rhinotracheitis.

56. A method for preventing or treating a gastrointestinal disorder, facilitating ulcer healing, or decreasing the recurrence of an ulcer in a patient in need thereof comprising administering to the patient a therapeutically effective amount of the composition of claim 5 or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

57. The method of claim 56, further comprising administering at least one antacid.

58. The method of claim 56, wherein the gastrointestinal disorder is an inflammatory bowel disease, Crohn's disease, irritable bowel syndrome, ulcerative colitis, a peptic ulcer, a stress ulcers, a bleeding peptic ulcer, a duodenal ulcer, infectious enteritis, colitis, diverticulitis, gastric hyperacidity, dyspepsia, gastroparesis, Zollinger-Ellison syndrome, gastroesophageal reflux disease, *Helicobacter Pylori* associated disease, short-bowel syndrome, or a hypersecretory state associated with systemic mastocytosis or basophilic leukemia and

hyperhistaminemia.

59. A method for preventing or treating a gastrointestinal disorder, facilitating ulcer healing, or decreasing the recurrence of an ulcer in a patient in need thereof comprising administering to the patient a therapeutically effective amount of at least one proton pump inhibitor or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

60. The method of claim 59, further comprising administering at least one antacid.

61. The method of claim 59, wherein the gastrointestinal disorder wherein the gastrointestinal disorder is an inflammatory bowel disease, Crohn's disease, irritable bowel syndrome, ulcerative colitis, a peptic ulcer, a stress ulcers, a bleeding peptic ulcer, a duodenal ulcer, infectious enteritis, colitis, diverticulitis, gastric hyperacidity, dyspepsia, gastroparesis, Zollinger-Ellison syndrome, gastroesophageal reflux disease, *Helicobacter Pylori* associated disease, short-bowel syndrome, or a hypersecretory state associated with systemic mastocytosis or basophilic leukemia and hyperhistaminemia.

62. A method for improving the gastroprotective properties, the anti-*Helicobacter* properties or the antacid properties of a proton pump inhibitor compound comprising administering to a patient in need thereof a therapeutically effective amount of a bismuth complex comprising at least one composition of claim 5.

63. A method for improving the gastroprotective properties, the anti-*Helicobacter* properties or the antacid properties of a proton pump inhibitor compound comprising administering to a patient in need thereof a therapeutically effective amount of a bismuth complex comprising at least one composition of claim 16.

64. A method for improving the gastroprotective properties, the anti-*Helicobacter* properties or the antacid properties of a proton pump inhibitor compound comprising administering to a patient in need thereof a therapeutically effective amount of a bismuth complex comprising at least one composition of

claim 35.

65. A method for decreasing or reversing gastrointestinal toxicity or facilitating ulcer healing resulting from administration of a nonsteroidal antiinflammatory drug and/or a selective COX-2 inhibitor to a patient comprising administering to a patient in need thereof a therapeutically effective amount of at least one composition of claim 5, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase, and, optionally, at least one nonsteroidal antiinflammatory drug and/or selective COX-2 inhibitor.

66. A method for decreasing or reversing gastrointestinal toxicity or facilitating ulcer healing resulting from administration of a nonsteroidal antiinflammatory drug and/or a selective COX-2 inhibitor to a patient comprising administering to a patient in need thereof a therapeutically effective amount of at least one proton pump inhibitor compound, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase, and, optionally, at least one nonsteroidal antiinflammatory drug and/or selective COX-2 inhibitor.

67. A method for treating *Helicobacter pylori* comprising administering to a patient in need thereof a therapeutically effective amount of at least one acid degradable antibacterial compound, at least one composition of claim 5 or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

68. A method for treating *Helicobacter pylori* comprising administering to a patient in need thereof a therapeutically effective amount of at least one acid degradable antibacterial compound, at least one proton pump inhibitor compound or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide

synthase.

69. A method for treating a viral infection comprising administering to a patient in need thereof a therapeutically effective amount of at least one composition of claim 5 and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

70. The method of claim 69, wherein the viral infection is orthomyxoviridae, paramyxoviridae, picornaviridae, rhabdoviridae, coronavaridae, togaviridae, bunyaviridae, arenaviridae, reteroviridae, adenoviridae, proxviridae, papovaviridae, herpetoviridae, herpesviridae, herpes simplex viruses, cytomegalovirus, herpes varicella-zoster, Epstein-Barr, HHV6, HHV7, pseudorabies or rhinotracheitis.

71. A method for treating a viral infection comprising administering to a patient in need thereof a therapeutically effective amount of at least one proton pump inhibitor compound or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

72. The method of claim 71, wherein the viral infection is orthomyxoviridae, paramyxoviridae, picornaviridae, rhabdoviridae, coronavaridae, togaviridae, bunyaviridae, arenaviridae, reteroviridae, adenoviridae, proxviridae, papovaviridae, herpetoviridae, herpesviridae, herpes simplex viruses, cytomegalovirus, herpes varicella-zoster, Epstein-Barr, HHV6, HHV7, pseudorabies or rhinotracheitis.

73. A kit comprising at least one compound of claim 2 or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

74. The kit of claim 73, wherein the compound of claim 2 or a pharmaceutically acceptable salt thereof, and the at least one compound that donates, transfers or releases nitric oxide, induces the production of endogenous

nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase are separate components in the kit or are in the form of a composition in the kit.

75. The kit of claim 73, further comprising at least one of a nonsteroidal antiinflammatory drug, a selective COX-2 inhibitor, an antacid, a bismuth-containing reagent and an acid-degradable antibacterial compound.

76. A kit comprising at least one proton pump inhibitor compound or a pharmaceutically acceptable salt thereof, and at least one compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase.

77. The kit of claim 76, wherein the proton pump inhibitor compound or a pharmaceutically acceptable salt thereof, and the compound that donates, transfers or releases nitric oxide, or induces the production of endogenous nitric oxide or endothelium-derived relaxing factor, or is a substrate for nitric oxide synthase are separate components in the kit or are in the form of a composition in the kit.

78. The kit of claim 76, further comprising at least one of a nonsteroidal antiinflammatory drug, a selective COX-2 inhibitor, an antacid, a bismuth-containing reagent and an acid-degradable antibacterial compound.